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SELF-MONITORING OF ATTENTIONAL BEHAVIOR VERSUS SELF-MONITORING OF PRODUCTIVITY: EFFECTS ON ON-TASK BEHAVIOR AND ACADEMIC RESPONSE RATE AMONG LEARNING DISABLED CHILDREN

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I investigated the differential effects of self-monitoring of attentional behavior and self-monitoring of productivity on on-task behavior and academic response rate. Subjects were four learning disabled children with significant attentional problems. Results indicated relatively equivalent increases in on-task behavior over baseline during all treatment phases. Academic response rate also improved under both interventions, with self-monitoring of productivity showing a superior effect for one subject, an equivalent effect for one subject, and less clear results for two subjects.

DESCRIPTORS: self-monitoring, self-regulation, on-task behavior, academic behavior, learning disabled

Self-monitoring, an important component of self-control techniques, has been defined as an individual's assessment of whether or not a target behavior has occurred and is usually followed by self-recording the event (Nelson & Hayes, 1981). However, determining the efficacy of self-monitoring procedures with children has been limited by both intervention and methodological issues, including confounding effects due to the use of prior or concurrent external contingencies, the integration of additional self-control procedures, failure to require correct and consistent implementation of self-monitoring procedures, lack of social validity data, and the choice of on-task behavior as both the sole target behavior and dependent variable (Baer, 1984; O'Leary & Dubey, 1979).

The focus on on-task behavior is surprising, because research has indicated that increased time on-task does not necessarily improve academic performance (Klein, 1979). Researchers have argued that it is not only attending but making an active academic response that is crucial to learning (Baer & Bushell, 1981; Graden, Thurlow, & Ysseldyke, 1983). Thus, self-monitoring of academic performance variables appears to be a promising research direction. However, such studies are rare, and no studies were found that compared self-monitoring of on-task behavior to self-monitoring of an active academic performance variable. The purpose of this investigation, therefore, was to compare the effects of these two self-monitoring procedures on both on-task behavior and academic performance, and to collect information on the social validity of these two interventions. I hypothesized that both self-monitoring interventions would result in increased time on-task, whereas self-monitoring of academic response rate would result in greater increases in academic performance than would self-monitoring of attention to task.

METHOD

Subjects

Subjects were four learning disabled students (ages 9 years 10 months to 10 years 6 months) receiving self-contained classroom services at a suburban elementary school. All subjects had IQ scores between 85 and 115 on the Weschler Intelligence Scale for Children–Revised, achievement scores at least 2 years below grade or age level in two or more academic areas, and were nominated by the

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classroom teacher as having significant attentional and productivity problems. Subjects 1 and 4 were female; Subjects 2 and 3 were male.

Tasks and Materials

Experimental procedures were implemented during a routine 15-min spelling seatwork period held each morning during which students completed a worksheet and then studied their spelling words. Prior to this investigation, all of the students in the classroom had demonstrated proficiency in a six-step spelling study technique: Look at the word, close eyes and spell the word out loud, study the word again, cover the word, write the word three times, and check spelling (Graham, 1983). A chart listing these steps was posted in the classroom. Spelling accuracy during practice was monitored daily throughout the study; none of the subjects spelled their words incorrectly during study times.

Dependent Variable One: On-Task

On-task behavior was defined as any time a student had his or her eyes focused on a book, paper, or self-monitoring question card, had eyes closed or word covered and lips moving, was writing words, or was checking words. Momentary time-sampling at 2-s intervals was used to measure on-task behavior for the final 10 min and 56 s of the 15-min spelling period (resulting in 82 observations per subject). Observations were conducted by the classroom teacher three to four times per week. Students were unaware that any individuals were being watched and believed the teacher was doing some important work for the school principal. The teacher was unaware of any directional hypotheses or underlying theoretical rationale; both the teacher and an aide were instructed not to interact with the subjects unless they requested assistance or serious behavior problems occurred (no serious behavior problems occurred).

A second trained observer was present during 32% (or 14) of the observation sessions; these observations were distributed equally across subjects and phases. Students believed she was assisting the teacher. Percent agreement reliability coefficients (number of agreements on occurrence and nonoccurrence divided by total number of observations multiplied by 100) ranged from 90% to 98% with a mean of 94%. Percent agreement for nonoccurrence was also determined because off-task behavior became less frequent as experimental procedures were introduced; it ranged from 61% to 90%, with a mean of 79%.

Dependent Variable Two: Academic Productivity

Academic productivity was defined as the total number of times a student correctly (no incorrect practices occurred) wrote his or her spelling words. Interrater reliability for this measure was 100%.

Procedures

Interventions were introduced via a counter-balanced multiple baseline design; order of the interventions was reversed for the last two subjects.

Baseline. During this and all subsequent conditions, students were instructed to begin work at the beginning of the period, and were reminded to file their papers at the end of the period.

Self-monitoring of attention. Self-monitoring procedures established by Hallahan, Lloyd, Kauffman, and Loper (1983) were followed. During an initial conference between the teacher and student, the importance and meaning of paying attention were discussed, and the teacher explained a technique that would help the student to pay attention. The student was instructed to ask the question, "Was I paying attention?" each time he or she heard a randomly emitted tone on a tape recorder (average interval, 45 s; range, 10–90 s). A piece of paper labeled "Was I paying attention?" was placed on the student's desk; a check was placed in the "yes" or "no" column after each tone. After the initial training conference, students used the procedure independently, 5 days per week. A new recording sheet was used each day and was placed in the student's spelling file at the end of the period. Volume on the tape recorder was kept low so that the tones were not audible to those subjects not involved in the procedure. As recommended by Hallahan et al. (1983), procedures for ensuring

accuracy of the "yes" and "no" self-recording were not included in the training components, because their research has indicated that attentional self-recording accuracy is not related to the reactive effects of this self-monitoring procedure. However, the teacher required and monitored compliance with the self-monitoring procedure; no refusals or failures to follow procedures were noted.

Self-monitoring of productivity. The teacher and student discussed the meaning and importance of spelling practice during an initial conference; the teacher then described a technique to help the student get more spelling practice done. The student was instructed to count the number of times his or her spelling words had been written at the end of the period, and then to record this number on a graph in his or her spelling file. This procedure was in effect 5 days per week and was used independently after the initial training session. Experimental data were obtained by having either the researcher or teacher count the words at a later time without the subjects' knowledge. Subjects were highly accurate in their self-recording of productivity. Discrepancies occurred only four times in cases where productivity scores were quite high (over 100), with the subject's score off by less than three. The teacher also monitored and required compliance with this procedure; no refusals or failures to follow procedures were noted.

Choice. When data collection had been completed under both of the self-monitoring conditions, each subject was required to choose one of the two procedures with which to continue. On-task and productivity data continued to be collected, but are not presented graphically because one subject changed his choice after several days and another subject decided to combine the two procedures.

Social Validity

At the conclusion of the study, the teacher and four subjects were interviewed separately to obtain information on perceived effectiveness of the interventions, personal preferences, recommendations, and other feedback. The same preset, open-ended questions were asked of all subjects.

RESULTS

On-Task Behavior

Mean baseline on-task scores for the four subjects were 57%, 32%, 44%, and 52%, respectively (see Figure 1). During the self-monitoring of attention phase, the four subjects' mean scores were 91%, 77%, 90%, and 91%, respectively. During the self-monitoring of productivity phase, mean on-task behavior scores were 87%, 75%, 89%, and 98%, respectively.

Academic Productivity

The four subjects' mean academic productivity scores during baseline were 22, 20, 14, and 32 practices, respectively (see Figure 2). Self-monitoring of attention resulted in scores of 44, 30, 27, and 43. The four subjects' mean scores during the productivity monitoring condition were 47, 78, 77, and 75. However, as can be seen in Figure 2, decreasing trends appear in the productivity data for Subjects 3 and 4 across the productivity monitoring and attention monitoring conditions. Thus, clear differences between the two self-monitoring conditions are apparent only for Subject 2.

Choice

Subject 1 chose self-monitoring of productivity. Over 27 sessions, her average on-task score was 92% (range, 67%–100%); her average productivity score was 58 practices (range, 22–105). Subject 2 also chose self-monitoring of productivity. Over 17 sessions, his on-task score averaged 71% (range, 46%–92%), and his productivity averaged 67 practices (range, 20–140). Subject 3 also chose productivity monitoring initially but changed to attention monitoring after several days. Over the first nine sessions (productivity monitoring), his average on-task score was 87% (range, 79%–100%) with an average of 74 practices (range, 29–165). For the last seven sessions (attention monitoring), his average on-task behavior score was 77% (range, 39%–96%), while his productivity average dropped to 16 practices (range, 11–20). This difference in productivity scores during the two conditions duplicates the earlier results for this subject.

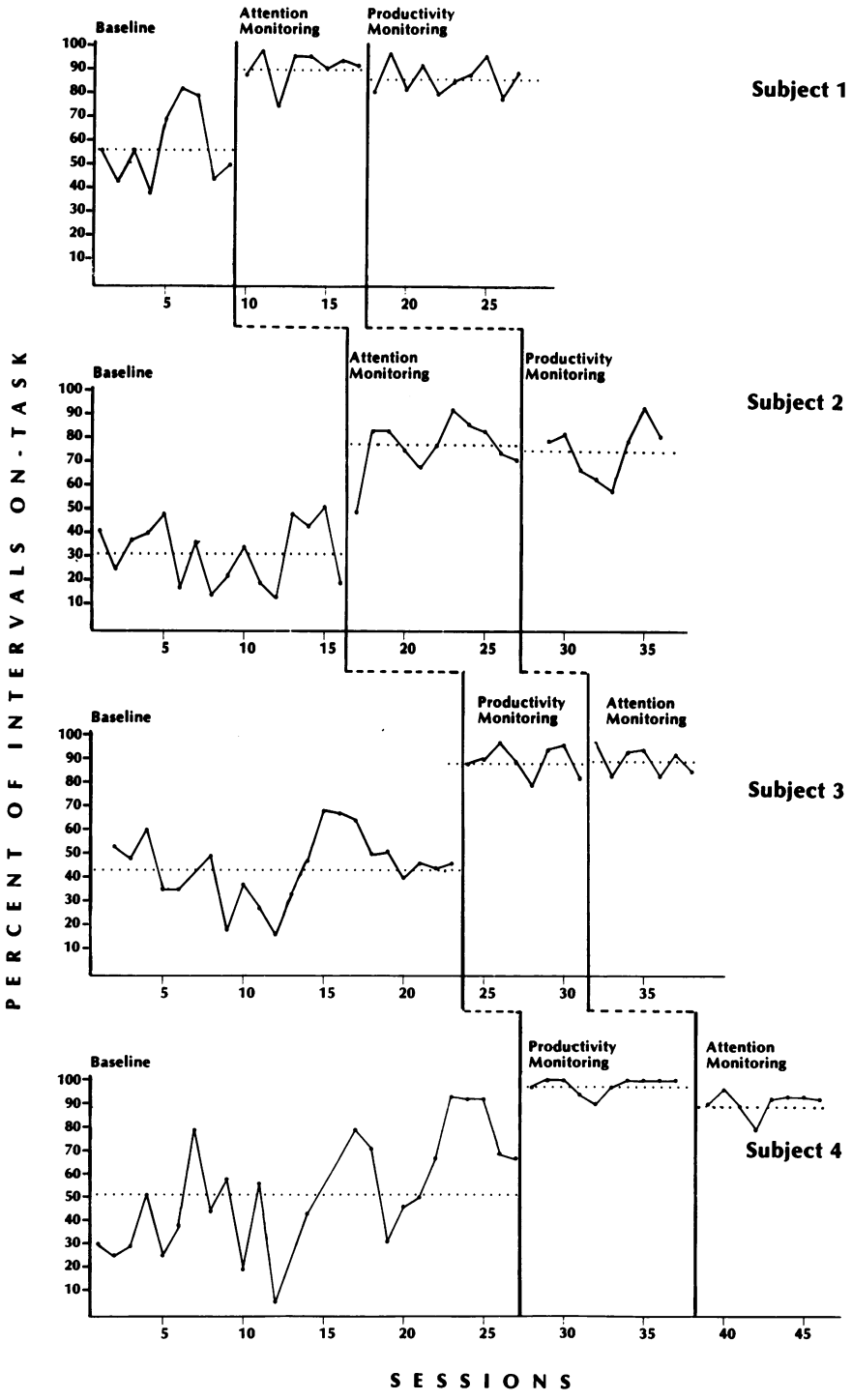

Figure 1. Percentage of intervals on-task during baseline, self-monitoring of attention, and self-monitoring of productivity.

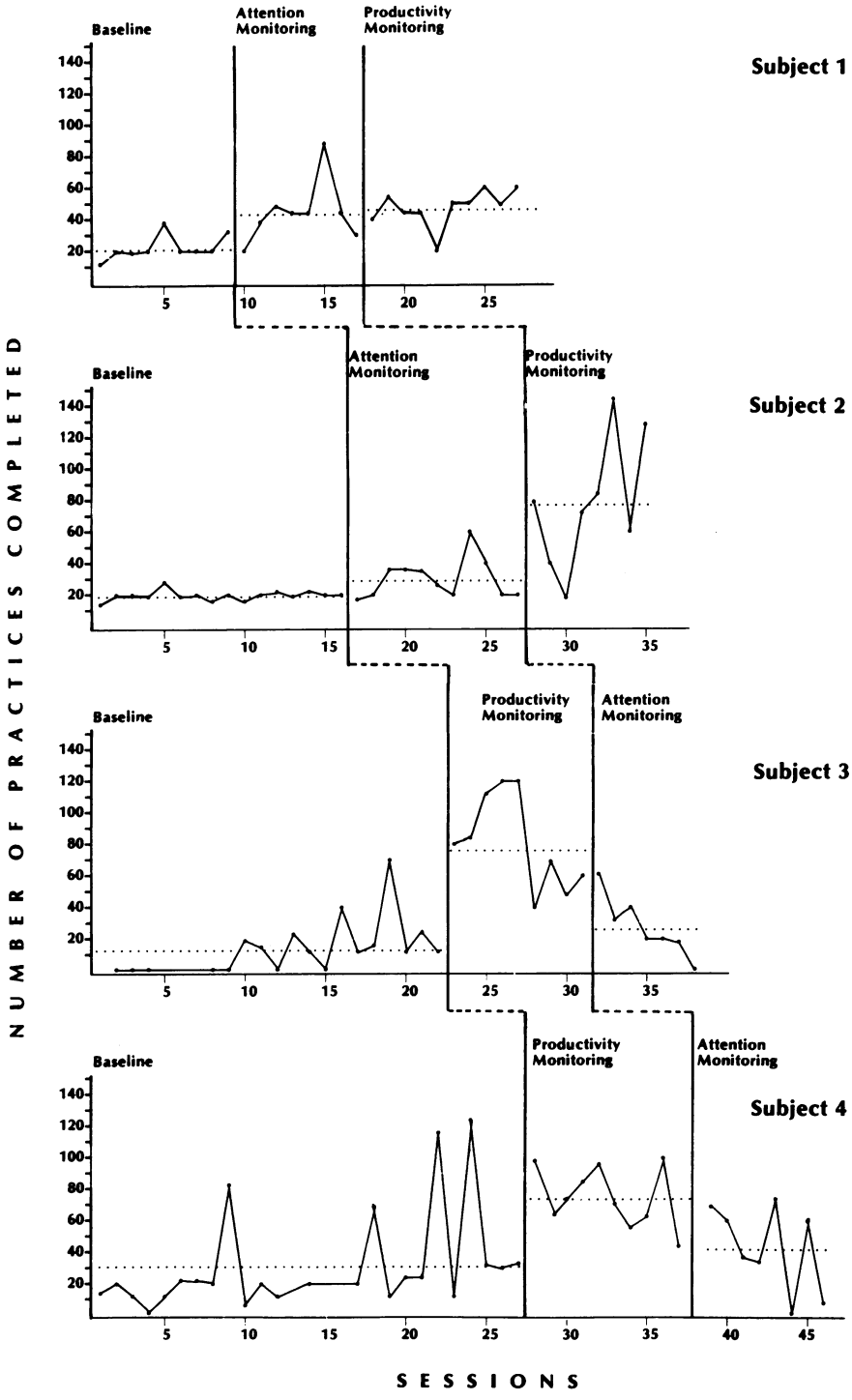

Figure 2. Productivity scores during baseline, self-monitoring of attention, and self-monitoring of productivity.

Subject 4 had difficulty making a choice, and decided to combine the two procedures. Under the combined self-monitoring of attention and productivity, across seven sessions, her average on-task score was 96% (range, 83%–100%) and her average productivity score was 95 practices (range, 32–141).

Interviews

All four of the subjects chose self-monitoring of productivity as the procedure they would most recommend, but also felt that self-monitoring of attention was important and useful. All of the subjects stated that they believed they would continue to do better spelling work even when they discontinued the self-monitoring procedures. Subjects' comments concerning what they liked about self-monitoring of productivity typically related to memorizing their words better. Subject 3 noted, "(The) graph helps (you) learn best because you have to write a certain amount of words . . . you get your words packed down in your mind." Comments suggested that both self-monitoring procedures provided self-reinforcement; self-monitoring of productivity also appeared to elicit goal setting in that subjects enjoyed meeting or beating previous personal scores. The classroom teacher indicated that both self-monitoring procedures were feasible and relatively simple to implement in the classroom, although the attention monitoring created extra demands in terms of equipment and space. She felt that her students responded well to both procedures and has continued their use.

DISCUSSION

Results indicated a meaningful increase in on-task behavior over baseline during both self-monitoring of attention and self-monitoring of productivity. Results were less clear, however, for academic response rate. Subject 1's performance was equivalent under the two conditions, whereas Subject 2's productivity level was superior in the productivity monitoring condition. Although mean phase levels of productivity were higher during productivity monitoring for Subjects 3 and 4, decreasing trends appear over the two conditions, making it difficult to determine whether productivity monitoring was actually more effective. Thus, further investigations comparing these approaches are necessary. Interviews indicated a high degree of social validity for both self-monitoring procedures, although subjects stated that their first choice was self-monitoring of productivity.

Differences between the two self-monitoring conditions should be noted. Self-monitoring of productivity involved a self-graphing component, whereas self-monitoring of attention did not. In addition, self-monitoring of attention may be seen as more intrusive and more time-consuming during the study period than self-monitoring of productivity. However, these differences are inherent in the self-monitoring procedures specifically designed for two different types of behavior. Hallahan et al. (1983) established the self-monitoring of attention procedure used in this study, and reported that subjects do not find it either highly intrusive or time-consuming; marking "yes" or "no" at the sound of the tone is a very brief procedure. Future research comparing these procedures might include a self-graphing component during self-monitoring of attention (subjects could graph the number of "yes" responses daily). However, because on-task scores were high under both interventions, it would appear unlikely that graphing the number of "yes" responses would have any further effects on performance. This should, however, be empirically investigated.

Previous research has indicated that accuracy of self-monitoring is frequently unnecessary in order to achieve desirable effects (O'Leary & Dubey, 1979). Hallahan et al. (1983) concluded, after a series of investigations, that this was true when using their self-monitoring of attention procedure, and thus recommended that components for monitoring subjects' accuracy of "yes" and "no" responses not be included in this intervention. In my investigation, positive effects on on-task behavior were established without evaluating or ensuring accuracy of "yes" and "no" responses. The self-monitoring of productivity procedures also did not involve any accuracy checks to the subjects' knowl-

edge. However, because either the teacher or researcher counted each subjects' practices daily at a later time, it can be noted here that subjects produced highly accurate and valid self-recordings.

A major limitation of this study is the lack of spelling achievement data. Although weekly scores were collected, they were not used as a dependent variable due to a marked ceiling effect and ethical constraints. Due to the teacher's use of individualized, functioning level spelling lists for each student in the classroom, students typically received scores of 75% or higher on weekly tests. It was judged undesirable to purposefully and significantly increase the difficulty level of the subjects' spelling words over the 4-month period of this study. The classroom teacher did state she felt that, because of the intervention procedures, she was able to increase the difficulty level of spelling words assigned to the four subjects at a rate faster than she had expected, and faster than that of other students in the classroom. Future studies should be designed to incorporate achievement scores as a dependent variable.

In summary, these results indicate that self-monitoring alone can be a powerful intervention and that self-monitoring of academic performance variables is a promising research direction. Further research is needed to explore the effects of self-monitoring of productivity on both performance rate and achievement across a variety of academic tasks, as well as to further compare self-monitoring of productivity to self-monitoring of attention.

REFERENCES

Baer, D. M. (1984). Does research on self-control need more self-control? *Analysis and Intervention in Developmental Disabilities,* **4,** 211–218.

Baer, D. M., & Bushell, D. (1981). The future of behavior analysis in the schools? Consider its recent past and then ask a different question. *School Psychology Review,* **10,** 259–270.

Graden, G., Thurlow, M., & Ysseldyke, J. (1983). Instructional ecology and academic responding time for students at three levels of teacher-perceived behavioral competence. *Journal of Experimental Child Psychology,* **36,** 241–256.

Graham, S. (1983). Effective spelling instruction. *Elementary School Journal,* **83,** 560–568.

Hallahan, D. P., Lloyd, G. W., Kauffman, J. M., & Loper, A. B. (1983). Academic problems. In R. J. Morris & T. R. Kratochwill (Eds.), *Practice of child therapy: A textbook of methods* (pp. 113–141). New York: Pergamon Press.

Klein, R. D. (1979). Modifying academic performance in the grade school classroom. In M. Hersen, R. M. Eisler, & P. M. Miller (Eds.), *Progress in behavior modification: Vol. 8* (pp. 293–321). New York: Academic Press.

Nelson, R. O., & Hayes, S. C. (1981). Theoretical explanations for reactivity in self-monitoring. *Behavior Modification,* **5,** 3–14.

O'Leary, G., & Dubey, D. R. (1979). Applications of self-control procedures by children: A review. *Journal of Applied Behavior Analysis,* **12,** 449–465.

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